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EXAMINER

KOLLIAS, ALEXANDER C

ART UNIT

PAPER NUMBER

1725

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/788,339	<b>Applicant(s)</b> TSUGE, SADAJI	
	<b>Examiner</b> ALEXANDER KOLLIAS	<b>Art Unit</b> 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 5) ☒ Claim(s) 16, 19, 20 and 28-30 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 16, 19-20 and 28-30 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

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### **DETAILED ACTION**

1. All outstanding claims objections and 35 USC 112, 2nd paragraph rejections are withdrawn in light of applicant's amendment filed on 12/8/2011.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior office action.
3. No new grounds of rejection are set forth below. Thus, the following action is properly made final.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 16, 18-20 and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
6. Claim 16 recites that the solar cell element contains at least 3  $\mu\text{mg/g}$  of sodium ions depositing from the front surface glass. However, it is noted that (a) the amount of 3  $\mu\text{g/g}$  of

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sodium ions as disclosed in the present Specification (Page 6 Lines 7-11) applies only to a specific film .i.e. PVF and not just any resin and (b) while the reference does explicitly disclose the concentration of 3  $\mu\text{g/g}$  of sodium ions, it must be noted that this is only a singular concentration of sodium ions and not range of sodium ions, must less the opened range recited in the present claims. That is, while there is support in the present Specification to recite a sodium ion concentration of 3  $\mu\text{g/g}$  in combination with a specific resin, i.e. PVF, there is no support in the Specification for the opened ended range of at least 3  $\mu\text{g/g}$  of sodium ions as recited in the present claims.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 16, 18-20, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-307791 (referred to hereafter as JP '791 – see English language translation attached to previous Office Action) in view of Baskett et al (US 3,957,537), Hanoka et al (US 5,476,553), Brandhorst (US 4,131,486), and Spitzer (US 4,667,060).

Regarding claim 16, JP '791 discloses a solar cell module (Figures 1 and 2) comprising:

- a. a solar cell element (Figure 1, item 1);
- b. a front surface glass member adhered at a light incidence side of the solar cell element by a resin (EVA 2 lying between the cells 1 and glass 3; Paragraph 0023)
- c. a rear surface film member comprising a transparent resin film adhered at a rear surface side of the solar cell element by a resin (PET film 4 is adhered at a rear surface side of the solar cell element by a resin EVA 2 lying between cells 1 and PET film 4; Paragraph 0023)
- d. the solar cell element includes a crystalline semiconductor substrate formed of an n-type crystalline semiconductor and a p-type amorphous silicon layer formed on one surface of the crystalline semiconductor substrate, and comprises a semiconductor

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junction formed by the n-type crystalline semiconductor substrate and the p-type amorphous silicon layer (Figure 2, and [0024] discloses a n-type crystalline silicon substrate 11, there is laminated an i-type a-Si layer 12 and p-type amorphous Si layer 13)

JP '791 teaches all the claim limitations as set forth above. However, the reference does not explicitly teach that the front glass contain sodium, that the resin for adhering the front surface glass at the light incidence side of the solar cell contains at least 3 mm/g of sodium ions depositing from the front surface glass, and that the solar cell element has the crystalline semiconductor substrate disposed on a side of the resin containing the sodium ion and the p-type amorphous silicon layer disposed on an opposite side of the resin so as to shield a diffusion of the sodium ion from the resin to the semiconductor junction.

Baskett et al discloses that glass is a preferred material utilized as a transparent member forming part of a solar module (Column 1 Lines 56-68). The reference discloses that glass in general is highly weather resistant, incombustible, and transparent to visible light (Column 1 Lines 55-68). Soda lime glass is particularly preferred given that it is noted transparent to ultraviolet light having a wavelength below about 300 nm and therefore protect the hold-melt adhesive which is utilized for adhering the glass to the module from degrading (Column 1 Lines 55-68). As evidenced by Hanoka et al EVA resin degrades under influence of ultraviolet light (Column 3 Lines 60-67).

Thus, given that JP '971 discloses the use of glass which is adhered to photovoltaic modules by an EVA resin which as evidenced by Hanoka et al EVA degrades under the influence of ultraviolet light, and given that Baskett et al discloses that soda lime silicate glass is

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utilized in photo-cells in order to prevent ultraviolet light from deteriorating the resin utilized in such devices, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the soda lime glass disclosed by Baskett et al in the solar module of JP '971 in order to prevent degradation of the EVA resin utilized to adhere the glass to the solar module with a reasonable expectation of success.

Further, it is noted that in such a combination, the presence of sodium ions in the resin lying between the cells and the glass member must be considered inherent, inasmuch as the instant disclosure teaches that sodium ions diffuse from a glass layer into the sealing resin under conventional conditions (Specification Page 5, line 19 - Page 7, line 2) Therefore, it is the Examiner's position given that solar module taught by the combination of prior art references would necessarily and intrinsically possess at least 3  $\mu\text{g/g}$  of sodium ions depositing from the front surface glass as presently claimed.

Regarding the position of the n-type crystalline substrate 11 with respect to the thin film amorphous layers 12, 13 and the light incidence side light transmitting member, the solar cell module of JP '791 allows light to enter from both sides (Figures 1, 5, and 6), but the front surface side light transmitting member 3 is at the principal light incidence side (see paragraphs 0023 and 0026-0028). Therefore, light coming in from either direction contributes to the generation of electricity. Furthermore, with respect to the solar cell in JP '791's Figure 2, note in JP '791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate 11, there is laminated an i-type a-Si layer 12 and p-type a-Si layer 13. It is also taught that on the principal plane on another side of the crystalline silicon substrate 11 there is laminated i-type a-Si layer 16 and n-type a-Si layer 17 (see paragraph 0024). JP '791 does not require said one

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principal plane on which the i-type a-Si layer 12 and p-type a-Si layer 13 to be the front face. JP '791 exemplifies the front face and recites "front face" in parenthesis for layers 12 and 13, and exemplifies the rear face and recites "rear face" in parenthesis for layers 16 and 17 (see paragraph 0024; and Figure 2). However, JP '791 does not require layers 12 and 13 to be at the front surface and layers 16 and 17 to be at the rear face. Thus, a skilled artisan readily recognizes that the solar cell seen in Figure 2 of JP '791 can be placed in JP '791's module in Figure 1 with layers 12 and 13 at the front face (i.e., layers 12 and 13 closer to light transmitting member 3) or at the rear face (i.e., layers 12 and 13 closer to rear surface member 4). Such is the case because the solar cell in said Figure 2 can receive light from both sides (see Figure 1; and the first sentence of paragraph 0024). Furthermore, the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst (Figures 2 and 4; and Column. 1, Line 60 through Column 2, Line 25) and Spitzer (see Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared JP '701's solar cell module such that the solar cell in JP '791's Figure 2 is present in the module with the p-i-n junction between layers 11, 12 and 13 at the rear face of the solar cell, and thus, the n-type crystalline silicon substrate 11 is between the resin adjacent principal light transmitting member 3 and the junction formed between p-type a-Si layer 13 and n-type substrate 11 because light can enter from both sides of JP '791's solar cell and thus, the p-i-n junction can be closer to either the light transmitting member 3 or the rear surface member 4; JP '791 is not limited to layers 12 and 13 to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst and Spitzer. In other words, to take the solar cell in JP '791's Figure 2, flip it over it



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over, and then insert it into JP '791's Figure 1, would have been within the level of ordinary skill in the art because light can enter from both sides of JP '791's solar cell in Figure 2, and thus, the p-i-n junction can be closer to either the light transmitting member 3 or the rear surface member 4; JP '791 is not limited to layers 12 and 13 to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst and Spitzer.

Regarding claim 18, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally, JP '791 teaches that crystalline semiconductor substrate comprises a single crystalline silicon( n-type crystalline substrate 11 of Figure 2 is a single crystalline silicon - Paragraph 0024) As there is no teaching of a thickness required to shield diffusion of sodium ion in the instant specification, the thickness of this substrate is considered to inherently provide some shielding of the diffusion of sodium ion as claimed.

Regarding claim 19, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally it is noted that in the combination of prior art references described above, n-type a-Si layer 17 will be disposed between the n-type c-Si substrate 11 and the resin containing sodium ion.

Regarding claim 20, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally, it is noted

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that in the combination of prior art reference described above, transparent ITO electrode 18 will be disposed between the n-type a-Si layer 17 and the resin containing sodium ion.

Regarding claim 28, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally, JP '791 teaches a collective electrode disposed between the transparent electrode and the resin containing the sodium ion (Figure 2—in the flipped over configuration item 19 is the collective electrode which is between the transparent electrode item 14 and the EVA resin - item 2 of Figure 1)

Regarding claim 29, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally, JP '791 teaches a cell module according further comprising: a transparent electrode formed on the p-type amorphous silicon layer (item 14 in Figure 2 is formed on item 13 the amorphous silicon layer)..

Regarding claim 30, the combined disclosures of JP '791, Baskett et al, Hanoka et al, Brandhorst, and Spitzer teach all the claim limitations as set forth above. Additionally, JP '791 teaches a solar cell module a collective electrode disposed between the transparent electrode on the p-type amorphous silicon layer and the resin containing the sodium ion (figure 2 item 19 in the flipped over configuration discussed above is between the EVA resin containing sodium ions and the transparent electrode item 14).

***Response to Arguments***

11. Applicant's arguments filed 12/8/2011 have been fully considered but they are not persuasive.

12. With respect to Applicants arguments regarding the rejection of the claim under 35 U.S.C. 112 first paragraph of reciting a range of sodium ion, i.e. at least 3  $\mu\text{g/g}$  of sodium ions, it is noted that although Applicants point to Page 6 of the instant Specification as disclosing that the quantity of sodium ions in the resin increases, the power generation performance decreases, it is noted that this portion fails to disclose a range, let alone an unbounded range which encompasses an upper bound amount of sodium ions, including 1 g, 1 kg, etc. Further, it is noted that although Page 6 described conventional solar cells and not exclusive structures as well as Page 8 discloses a large number of materials, including PET, PVDF, etc, this does not imply or indicate a range of sodium ion concentration as recited in the present claims. As discussed above, while the Specification discloses a specific sodium ion concentration for a specific configuration or embodiment, there is no support in the Specification as originally filed to recite an open ended range as recited in the present claims.

13. Applicants argue that JP '971 as well combination of references, Brandhorst and Spitzer fail to disclose the presently claimed configuration, i.e. light entering from a side opposite the junction. However, while it is agreed that JP '971 alone fails to exemplify this particular configuration, it is significant to note that the position of the n-type crystalline substrate 11 with respect to the thin film amorphous layers 12, 13 and the light incidence side light transmitting

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member, the solar cell module of JP '791 allows light to enter from both sides (Figures 1, 5, and 6), but the front surface side light transmitting member 3 is at the principal light incidence side (see paragraphs 0023 and 0026-0028). Therefore, light coming in from either direction contributes to the generation of electricity. Furthermore, with respect to the solar cell in JP '791's Figure 2, note in JP '791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate 11, there is laminated an i-type a-Si layer 12 and p-type a-Si layer 13. It is also taught that on the principal plane on another side of the crystalline silicon substrate 11 there is laminated i-type a-Si layer 16 and n-type a-Si layer 17 (see paragraph 0024). JP '791 does not require said one principal plane on which the i-type a-Si layer 12 and p-type a-Si layer 13 to be the front face. JP '791 exemplifies the front face and recites "front face" in parenthesis for layers 12 and 13, and exemplifies the rear face and recites "rear face" in parenthesis for layers 16 and 17 (see paragraph 0024; and Figure 2). However, JP '791 does not require layers 12 and 13 to be at the front surface and layers 16 and 17 to be at the rear face. Thus, a skilled artisan readily recognizes that the solar cell seen in Figure 2 of JP '791 can be placed in JP '791's module in Figure 1 with layers 12 and 13 at the front face (i.e., layers 12 and 13 closer to light transmitting member 3) or at the rear face (i.e., layers 12 and 13 closer to rear surface member 4). Such is the case because the solar cell in said Figure 2 can receive light from both sides (see Figure 1; and the first sentence of paragraph 0024). Furthermore, the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst (Figures 2 and 4; and Column. 1, Line 60 through Column 2, Line 25) and Spitzer (see Figure 1).

In light of the disclosure in JP '791 as well as the evidence Brandhorst and Spitzer, it is the Examiner's position, absent evidence to the contrary, that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared JP '701's solar cell module such that the solar cell in JP '791's Figure 2 is present in the module with the p-i-n junction between layers 11, 12 and 13 at the rear face of the solar cell, and thus, the n-type crystalline silicon substrate 11 is between the resin adjacent principal light transmitting member 3 and the junction formed between p-type a-Si layer 13 and n-type substrate 11 because light can enter from both sides of JP '791's solar cell and thus, the p-i-n junction can be closer to either the light transmitting member 3 or the rear surface member 4; JP '791 is not limited to layers 12 and 13 to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst and Spitzer.

In other words, to take the solar cell in JP '791's Figure 2, flip it over it over, and then insert it into JP '791's Figure 1, would have been within the level of ordinary skill in the art because light can enter from both sides of JP '791's solar cell in Figure 2, and thus, the p-i-n junction can be closer to either the light transmitting member 3 or the rear surface member 4; JP '791 is not limited to layers 12 and 13 to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst and Spitzer.

Further Applicants argue that the rejection of record proposed to dismantle and reconstruct the solar module disclosed by JP '791 in order to meet the present claim limitations. However, it is not the Examiner's position to dismantle and disintegrate the solar module

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disclosed by the primary reference. Rather it is the Examiner's position, absent evidence to the contrary, given that the reference discloses that light enters the module from both sides, that it would have been obvious to one of ordinary skill in the art to arrange the junction as recited in the present claims given that JP '791's discloses that light enters the both sides of solar cell solar cell in Figure 2, and thus, the rearrangement of the p-i-n junction would result is the junction begin closer to either the light transmitting member 3 or the rear surface member 4. That is, it is the Examiner's position that the currently proposed arrangement of the junction would have been obvious to one of ordinary skill in the art given that JP '791 is not limited to layers 12 and 13 being at the front surface and given the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst and Spitzer.

Applicants argue that the issue is whether or not it would have been within the level of skill in the art of to modify the disclosure of JP '791 in order to obtain the presently claimed arrangement does not establish that it would have been obvious to do so. However, it is firstly noted that no evidence has been provided which would indicate that it would not have been obvious to one of ordinary skill in the art to do. Secondly, it is noted that the given the disclosure within the primary reference that light enters from both sides of the solar cell in combination with the supported teachings of Brandhorst and Spitzer, the Examiner's position remains that it would have been obvious to one of ordinary skill in the art to modify the junction configuration disclosed by JP '791 and arrive at the presently claimed invention.

***Conclusion***

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER C. KOLLIAS whose telephone number is (571)-270-3869. The examiner can normally be reached on Monday-Friday, 8:00 AM -5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571)-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. C. K./  
Examiner, Art Unit 1725

/Basia Ridley/  
Supervisory Patent Examiner, Art Unit 1725